

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)	
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Richard E. DEMARAY et al.)	Group Art Unit: 1731
)	
Application No.: 09/903,081)	Examiner: John M. HOFFMAN
)	
Filed: July 10, 2001)	
)	
For: AS-DEPOSITED PLANAR OPTICAL)	Confirmation No.: 1225
WAVEGUIDES WITH LOW)	
SCATTERING LOSS AND METHODS)	
FOR THEIR MANUFACTURE)	

Attention: Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

APPEAL BRIEF UNDER RULE § 41.37

In support of the Notice of Appeal filed April 24, 2008, further to 37 C.F.R. § 41.37, Appellants present this Appeal Brief and submit herewith the fee of \$510.00 required under 37 C.F.R. § 41.20(b)(2).

This Appeal is filed to appeal the rejections of claims 14-20, 24-27, and 29 set forth in the final Office Action mailed January 29, 2008 (hereafter referred to as "final Office Action").

This Appeal Brief is being submitted along with a petition for extension of time under 37 C.F.R. § 1.136 and the required fees, extending the period for submitting the Appeal Brief by one month to July 24, 2008.

If any additional fees are required or if the enclosed payment is insufficient, Appellants request that the required fees be charged to Deposit Account No. 06-0916.

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I. REAL PARTY IN INTEREST

The real party in interest is Springworks, LLC, a corporation organized under the laws of Delaware, and having its primary place of business in Minnetonka, Minnesota, as evidenced by the chain of title presented below.

An assignment assigning the inventors' interest to Symmorphix, Inc., was recorded on July 10, 2001, at Reel/Frame 012010/0752. A license agreement granting a license in Symmorphix, Inc.'s interest to Infinite Power Solutions, Inc., was recorded on July 31, 2006 at Reel/Frame 019781/0636. An assignment assigning Symmorphix, Inc.'s interest to Springworks, LLC, was recorded on November 19, 2007 at Reel/Frame 020134/0102.

II. RELATED APPEALS AND INTERFERENCES

There are currently no other appeals or interferences, of which Appellants, Appellants' legal representative, or the Assignee is aware, that will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 14-29 are currently pending in this application, of which claims 21-23 and 28 have been withdrawn from consideration. Claims 1-13 were previously canceled. Claims 14-20, 24-27, and 29 have been presented for examination and are the subject of this appeal.

In the final Office Action mailed January 29, 2008, the Examiner made the following rejections:

- 1) Claims 16 and 19 under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which Appellants regard as the invention;
- 2) Claim 14 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 4,619,680 to Nourshargh (*Nourshargh*) in view of U.S. Patent No. 6,117,345 to Liu (*Liu*) and U.S. Patent No. 6,154,582 to Bazylenko (*Bazylenko*);
- 3) Claims 15-17, 24-26, and 29 under 35 U.S.C. § 103(a) as being unpatentable over *Nourshargh* in view of *Liu* and *Bazylenko*, as applied to claim 14, and in further view of U.S. Patent No. 3,850,604 to Klein (*Klein*);
- 4) Claims 18-20 under 35 U.S.C. § 103(a) as being unpatentable over *Nourshargh* in view of *Liu*, *Bazylenko*, *Klein*, and U.S. Patent No. 4,915,810 to Kestigian (*Kestigian*); and
- 5) Claim 27 under 35 U.S.C. § 103(a) as being unpatentable over *Nourshargh* in view of *Liu* and *Bazylenko*, as applied to claim 14, and in further view of U.S. Patent No. 6,615,614 to Makikawa (*Makikawa*).

In addition, beginning at the bottom of page 8 of the final Office Action, the Examiner included additional rejections under 35 U.S.C. § 103(a). However, in a telephone call on March 14, 2008, the Examiner confirmed that these additional rejections were inadvertently and mistakenly added to the Office Action through a copy/paste error, and should not be considered by Appellants. Accordingly, those additional rejections and arguments are not specifically treated herein.

The claims on appeal are set forth in Section VIII entitled "Claims Appendix."

IV. STATUS OF AMENDMENTS

Appellants filed an Amendment on December 7, 2007, to amend paragraphs [0008], [0021], [0023], and [0038] of the specification, and to amend claims 14-20, 24, 25, 27, and 29. The Amendment filed December 7, 2007 has been entered.

V. SUMMARY OF CLAIMED SUBJECT MATTER

An embodiment consistent with the present invention, as recited in independent claim 14, is directed to a process of fabricating a planar optical device. The process may include forming a plurality of ridge structures (FIG. 1C: 11; FIG. 4B: 11P) in a lower cladding layer (FIG. 1C: 10; FIG. 4B: 10) of a first material (paragraph [0023]). The lower cladding layer may have a first refractive index (paragraph [0026]). Each of the plurality of ridge structures (FIG. 1C: 11; FIG. 4B: 11P) may have a top surface (FIG. 1C: 16) and sidewalls (FIG. 1C: 12; paragraphs [0008], [0023], and [0038], as amended in the amendment filed December 7, 2007, and clearly shown in at least FIGS 1A-1C and FIGS. 4A and 4B).

The process may also include simultaneously depositing and etching a core layer (FIG. 1C: 20; FIG. 4B: 20B, 22, 25) over the plurality of ridge structures (FIG. 1C: 11; FIG. 4B: 11P) to form an intermediate structure (paragraph [0035]). The core layer (FIG. 1C: 20; FIG. 4B: 20B, 22, 25) may comprise a core material having a second refractive index greater than the first refractive index (paragraph [0026]). Moreover, the core layer may completely and continuously cover an entire surface of the top surface (FIG. 1C: 16), an entire surface of the sidewalls (FIG. 1C: 12), and an entire surface of horizontal surfaces (FIG. 1C: 14) between each of the plurality of ridge structures (FIG. 1C: 11; FIG. 4B: 11P; paragraphs [0023] and [0038], as amended in the amendment filed December 7, 2007, and clearly shown in at least FIGS 1A-1C and FIGS. 4A and 4B).

The process may also include depositing an upper cladding layer (FIG. 1C: 30) over the intermediate structure (paragraph [0023]). The upper cladding layer (FIG. 1C: 30) may comprise

an upper cladding material having a third refractive index less than the second refractive index (paragraph [0025]).

An embodiment consistent with the present invention, as recited in independent claim 18, is directed to a process of fabricating a planar optical device. The process may include forming a plurality of ridge structures (FIG. 1C: 11; FIG. 4B: 11P) in a lower cladding layer (FIG. 1C: 10; FIG. 4B: 10) of a first material (paragraph [0023]). The lower cladding layer may have a first refractive index (paragraph [0026]). Each of the plurality of ridge structures (FIG. 1C: 11; FIG. 4B: 11P) may have a top surface and sidewalls (paragraphs [0008], [0023], and [0038], as amended in the Amendment filed on December 7, 2007, and clearly shown in at least FIGS 1A-1C and FIGS. 4A and 4B).

The process may also include simultaneously depositing and etching a core layer (FIG. 1C: 20; FIG. 4B: 20B, 22, 25) over the plurality of ridge structures (FIG. 1C: 11; FIG. 4B: 11P) to form an intermediate structure. The core layer (FIG. 1C: 20; FIG. 4B: 20B, 22, 25) may include a core material having a second refractive index greater than the first refractive index (paragraph [0026]). Moreover, the core layer may completely and continuously cover an entire surface of the top surface (FIG. 1C: 16), an entire surface of the sidewalls (FIG. 1C: 12), and an entire surface of horizontal surfaces (FIG. 1C: 14) between each of the plurality of ridge structures (FIG. 1C: 11; FIG. 4B: 11P, paragraphs [0023] and [0038], as amended in the amendment filed December 7, 2007, and clearly shown in at least FIGS 1A-1C and FIGS. 4A and 4B).

The process may also include depositing an upper cladding layer (FIG. 1C: 30) over the intermediate structure ([paragraph [0023]). The upper cladding layer (FIG. 1C: 30) may include

an upper cladding material having a third refractive index less than the second refractive index (paragraph [0025]).

In addition, the core layer may be deposited by a physical vapor deposition process (paragraphs [0027] and [0028]). In the physical vapor deposition process, at least one of the plurality of ridge structures may be positioned opposite a central region of a target (FIG. 3: 52, paragraph [0028]). The target (FIG. 3: 52) may also include the central region and outer regions, wherein the central region includes the core material and the outer regions may include material of lower refractive index than the core material (paragraph [0040]). In the physical vapor deposition process, a first radio frequency power may be applied to the target in the presence of a gas such creating a uniform plasma condition in the vicinity of the target (paragraphs [0029] and [0030]), and material from the target (FIG. 3: 52) may be sputtered onto at least one of the plurality of ridge structures (FIG. 1C: 11; FIG 4B: 11P, paragraphs [0037] and [0038]).

An embodiment consistent with aspects of the present invention, as recited in independent claim 29, is directed to a method of fabricating a planar optical device. The method may include forming a plurality of ridge structures (FIG. 1C: 11; FIG. 4B: 11P) in a layer of cladding material (FIG. 1C: 10; FIG. 4B: 10). Each of the plurality of ridge structures (FIG. 1C: 11; FIG. 4B: 11P) may have a top surface (FIG. 1C: 16) and sidewalls (FIG. 1C: 12; paragraphs [0008], [0023], and [0038], as amended in the amendment filed December 7, 2007, and clearly shown in at least FIGS 1A-1C and FIGS. 4A and 4B).

The process may also include forming an intermediate structure by simultaneously depositing and etching core material (FIG. 1C: 20; FIG. 4B: 20B, 22, 25) overlying the plurality of ridge structures (FIG. 1C: 11; FIG. 4B: 11P). The simultaneous depositing and etching may

be performed by a physical vapor deposition process (paragraphs [0027] and [0028]). The physical deposition process may be performed in the presence of a background gas (paragraphs [0029] and [0030]), wherein a first radio frequency power may be applied to a sputtering target (FIG. 3: 52) which may include the core material (paragraph [0028]). In the physical vapor deposition process, a second radio frequency power may be applied (paragraph [0028] and paragraph [0034]) to at least one of the plurality of ridge structures (FIG. 1C: 11; FIG. 4B: 11P). As a result of the physical vapor deposition process, the core layer may completely and continuously cover an entire surface of the top surface (FIG. 1C: 16), an entire surface of the sidewalls (FIG. 1C: 12), and an entire surface of horizontal surfaces (FIG. 1C: 16) formed between each ridge structure of the plurality of ridge structures (FIG. 1C: 11; FIG. 4B: 11P; paragraphs [0008], [0023], and [0038], as amended in the amendment filed December 7, 2007, and clearly shown in at least FIGS 1A-1C and FIGS. 4A and 4B).

The method may further include depositing an upper cladding layer (FIG. 1C: 30) over the intermediate structure. The upper cladding layer may include a second cladding material, wherein the refractive index of the core material is greater than the refractive index of the first cladding material and of the second cladding material (paragraph [0025]).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

1. Claims 16 and 19 stand rejected under 35 U.S.C. § 112, second paragraph.
2. Claim 14 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over *Nourshargh* in view of *Liu* and *Bazylenko*.
3. Claims 15-17, 24-26, and 29 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Nourshargh* in view of *Liu* and *Bazylenko* and in further view of *Klein*.
4. Claims 18-20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Nourshargh* in view of *Liu*, *Bazylenko*, *Klein*, and *Kestigian*; and
5. Claim 27 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over *Nourshargh* in view of *Liu* and *Bazylenko* and in further view of *Makikawa*.

VII. ARGUMENT

A. Introduction

Each claim of this patent application is separately patentable and, upon issuance of a patent, will be entitled to a separate presumption of validity under 35 U.S.C. § 282. That is, each of claims 14-20, 24-27, and 29 should be considered individually in light of the arguments against the Examiner's rejections.

B. Detailed Arguments

1. The rejection of claims 16 and 19 under 35 U.S.C. § 112, second paragraph should be reversed.

The rejection of claims 16 and 19 under 35 U.S.C. § 112 second paragraph should be reversed because claims 16 and 19 are not indefinite.

The Examiner asserts that "[t]here is confusing antecedent basis for 'at least one of the plurality' in claims 16 and 19 ... [because] [t]hey depend from claims which refer to 'at least one.'" Final Office Action, page 3. Claim 16 depends directly from claim 15, and indirectly from claim 14. Claim 14 recites a combination including "a plurality of ridge structures," and claim 15 recites a combination including "at least one of the plurality of ridge structures is positioned opposite a target," and "sputtering material from the target onto at least one of the plurality of ridge structures." Claim 16 then recites a combination including "applying a second radio frequency power to at least one of the plurality of ridge structures."

As is evident from the plain language of the claims, claim 14 requires "a plurality of ridge structures." Of these claimed "ridge structures" at least one may be "positioned opposite a target," at least one may have material sputtered thereon, and at least one may have "a second radio frequency power" applied thereto. The plain language of the claims do not require any

single ridge structure of the claimed “plurality of ridge structures” to be “positioned opposite a target,” have a material sputtered thereon, or have “a second radio frequency power” applied thereto. A person having ordinary skill in the art would readily recognize that according to the plain language of the claims, the “second radio frequency power” may be applied to any of the “plurality of ridge structures.” If the scope of a claim would be reasonably ascertainable by those skilled in the art, then the claim is not indefinite. Energizer Holdings Inc. v. Int’l Trade Comm’n, 435 F.3d 1366, 77 USPQ2d 1625 (Fed. Cir. 2006). Accordingly, claim 16 is not indefinite for at least this reason.

Moreover, if the rejection under 35 U.S.C. § 112, second paragraph has been made because a particular ridge structure or ridge structures of the claimed “plurality of ridge structures” to which the “second radio frequency power may be applied” cannot be identified, as noted above, the “second radio frequency power” may be applied to any of the “plurality of ridge structures.” Limiting the claim to a particular ridge structure impermissibly narrows that which Appellants have a right to claim, and breadth of a claim is not to be equated with indefiniteness. In re Miller, 441 F.2d 689, 169 USPQ 597 (CCPA 1971).

Accordingly, the scope of claim 16 is reasonably ascertainable by a person having ordinary skill in the art. The rejection of claim 16 under 35 U.S.C. § 112, second paragraph is thus improper. Therefore, the rejection of claim 16 under 35 U.S.C. § 112, second paragraph should be reversed.

Claim 19 depends directly from claim 18. Claim 18 recites a combination including “a plurality of ridge structures,” “at least one of the plurality of ridge structures is positioned opposite a central region of a target,” and “sputtering material from the target onto at least one of

the plurality of ridge structures.” Claim 19 recites a combination including “applying a second radio frequency power to at least one of the plurality of ridge structures.” Because the recitations in claim 19 are similar to those recited in claim 16, claim 19 is not indefinite for at least the reasons presented above with respect to claim 16. The rejection of claim 19 under 35 U.S.C. § 112, second paragraph is thus improper. Therefore the rejection of claim 19 under 35 U.S.C. § 112, second paragraph should be reversed.

2. The rejection of claims 14-20, 24-27, and 29 under 35 U.S.C. § 103(a) should be reversed

Appellants respectfully request that the Board reverse the rejection of claims 14-20, 24-27, and 29 under 35 U.S.C. § 103(a) because a *prima facie* case of obviousness has not been established with respect to these claims. “The key to supporting any rejection under 35 U.S.C. § 103 is the clear articulation of the reason(s) why the claimed invention would have been obvious . . . [r]ejections on obviousness cannot be sustained with mere conclusory statements.” MPEP § 2142, 8th Ed., Rev. 6 (Sept. 2007) (internal citation and inner quotation omitted). “The mere fact that references can be combined or modified does not render the resultant combination obvious unless the results would have been predictable to one of ordinary skill in the art.” MPEP § 2143.01(III) (emphasis in original). “In determining the differences between the prior art and the claims, the question under 35 U.S.C. 103 is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious.” MPEP § 2141.02(I), (emphasis in original).

Several basic factual inquiries must be made in order to determine the obviousness or non-obviousness of claims of a patent application under 35 U.S.C. § 103. These factual

inquiries, set forth in Graham v. John Deere Co., 383 U.S. 1, 17, 148 USPQ 459, 467 (1966), require the Examiner to:

- (1) Determine the scope and content of the prior art;
- (2) Ascertain the differences between the prior art and the claims in issue;
- (3) Resolve the level of ordinary skill in the pertinent art; and
- (4) Evaluate evidence of secondary considerations.

The obviousness or non-obviousness of the claimed invention is then evaluated in view of the results of these inquiries. Graham, 383 U.S. at 17-18, 148 USPQ at 467; *see also* KSR Internat'l Co. v. Teleflex Inc., 127 S. Ct. 1727, 82 USPQ2d 1385 (2007); *see also* MPEP § 2141(II).

Appellants respectfully submit that the cited references, taken alone or in combination, fail to render obvious claims 14-20, 24-27, and 29 because the scope and content of these references do not include all of the features recited in claims 14-20, 24-27, and 29. Furthermore, the Examiner has not given any reason as to why it would have been obvious to include the features missing from the cited references

A. The rejection of claim 14 under 35 U.S.C. § 103(a) as being unpatentable over *Nourshargh* in view of *Liu* and *Bazylenko* should be reversed

Claim 14 recites a combination including at least “the core layer completely and continuously covers an entire surface of the top surface, an entire surface of the sidewalls, and an entire surface of horizontal surfaces between each of the plurality of ridge structures,” as recited in claim 14. At least this element is not disclosed or suggested in the scope and content of *Nourshargh*.

Nourshargh illustrates in Figs. 2(b) and 2(c), for example, a waveguide including a substrate 11, a groove 13, and a core glass 14. *See also* *Nourshargh*, col. 2, lines 7-17. In the

final Office Action, the Examiner asserts that “[a]lthough not disclosed, one would immediately realize when the stripes are made, that those areas between any two adjacent stripes would be one of the structures, with both walls thereof covered.” Final Office Action, page 4. Contrary to the Examiner’s assertion, however, *Nourshargh* clearly does not disclose or suggest that the structure of *Nourshargh* has “both walls thereof covered.”

If top elevated surface of substrate 11, groove 14, and the vertical surface therebetween of *Nourshargh* can reasonably be construed as respectively corresponding to Appellants’ claimed “top surface,” “horizontal surface,” and “sidewalls,” Fig. 2(c) clearly shows that “the entire surface” of vertical surface between top elevated surface of substrate 11 and groove 13 is not “completely and continuously cover[ed]” by core glass 14. That is, to the extent that the vertical surface between substrate 11 and groove 14 can reasonably be construed as corresponding to Appellants’ claimed “sidewalls,” *Nourshargh* clearly fails to disclose completely and continuously covering the vertical surface. *Nourshargh* thus fails to provide any disclosure of “the core layer completely and continuously covers an entire surface of the top surface, an entire surface of the sidewalls, and an entire surface of horizontal surfaces between each of the plurality of ridge structures,” as recited in claim 14.

Moreover, *Nourshargh* discloses:

the desired waveguide pattern is first written on a substrate 11 using photolithography ... core glass 14 is deposited on the substrate ... and by suitably controlling the amount of dopant in the core glass as the dopant in the core glass as the deposition process is carried out, it may have any desired refractive-index profile across its thickness which is less than the depth of the grooves 13 so that the waveguide is fully embedded within the grooves 13. *Nourshargh*, col. 2, lines 7-28 (emphasis added).

Thus, as further shown in Fig. 2(c), since the thickness of the core glass 14 is less than the depth of the grooves 13, core glass 14 does not “completely and continuously cover[] the entire surface” of vertical surface (characterized by the Examiner as allegedly corresponding to Appellants’ claimed “sidewalls”) between top elevated surface of substrate 11 and groove 13.

Thus, contrary to the Examiner’s assertion, *Nourshargh* provides explicit disclosure in the specification and figures that *Nourshargh* does not disclose or suggest core glass “completely and continuously covering the entire surface” of vertical surface between top elevated surface of substrate 11 and groove 13. Accordingly, *Nourshargh* fails to disclose or suggest a combination including “the core layer completely and continuously covers an entire surface of the top surface, an entire surface of the sidewalls, and an entire surface of horizontal surfaces between each of the plurality of ridge structures,” as recited in Appellants’ claim 14.

However, despite the clear showing made above that *Nourshargh* fails to disclose or suggest a combination including “the core layer completely and continuously covers an entire surface of the top surface, an entire surface of the sidewalls, and an entire surface of horizontal surfaces between each of the plurality of ridge structures,” as recited in Appellants’ claim 14, the Examiner asserts that such a showing is “not very relevant.” Specifically, the Examiner asserts that “[i]t is also argued that *Nourshargh*’s figure 2)c) [sic] clearly shows that ‘the entire surface’ of vertical surface is not completely and continuously covered ... [t]his does not appear to be very relevant because the Office made a finding as to what the broadest reasonable interpretation is, and since applicant has not made any specific assertions regarding any specific finding, Applicant should be reasonably entitled to utilize the Office’s broadest interpretation in any future legal proceedings regarding this application.” Final Office Action, page 7. The “broadest

reasonable interpretation” referred to by the Examiner appears to refer to the Office Action mailed April 13, 2007, wherein the Examiner states “[t]hus it is deemed that the broadest reasonable interpretation of the claimed portions encompasses a limited part (of the ridge/sidewall/plane) abstracted from the whole.” Office Action mailed April 13, 2007, page 6. However, Appellants have amended the claim 14 to specifically recite a combination including “the core layer completely and continuously covers an entire surface of the top surface, an entire surface of the sidewalls, and an entire surface of horizontal surfaces between each of the plurality of ridge structures” (emphasis added) to further distinguish claim 14 from the cited references including *Nourshargh*, and to overcome the Examiner’s numerous rejections under 35 U.S.C. § 112. Accordingly, the Examiner’s assertions that Appellants’ arguments with respect to *Nourshargh* are “not relevant” is unfounded and incorrect.

For at least these additional reasons, submitted with the clear demarcation between claim 14 and *Nourshargh* illustrated above, *Nourshargh* fails to disclose or suggest a combination including “the core layer completely and continuously covers an entire surface of the top surface, an entire surface of the sidewalls, and an entire surface of horizontal surfaces between each of the plurality of ridge structures,” as recited in Appellants’ claim 14.

Liu fails to cure the deficiencies of *Nourshargh*. *Liu* generally teaches “[a] method for depositing dielectric material into gaps between wiring lines in the formation of a semiconductor device.” *Liu*, abstract. *Liu*, however, is silent as to at least a “core layer,” and thus cannot provide any disclosure or suggestion of “the core layer completely and continuously covers an entire surface of the top surface, an entire surface of the sidewalls, and an entire surface of

horizontal surfaces between each of the plurality of ridge structures,” as recited in claim 14.

Moreover, *Liu* fails to provide any disclosure that claim 14 is obvious.

Bazylenko fails to cure the deficiencies of *Nourshargh* and *Liu*. *Bazylenko* discloses “[t]he core layer is then chemically etched (FIG. 10b) to produce a chemically etched step profile 19A.” *Bazylenko*, col. 9, lines 61-62. That is, *Bazylenko* teaches forming a core layer, and then etching a portion of the core layer. Because *Bazylenko* teaches removing a portion of the core layer, the core layer of *Bazylenko* cannot “completely and continuously cover[] an entire surface of the top surface, an entire surface of the sidewalls, and an entire surface of horizontal surfaces between each of the plurality of ridge structures,” as recited in claim 14 (emphasis added). Thus, not only does *Bazylenko* fail to disclose this feature, *Bazylenko* teaches away from such a combination including the claimed feature, and it is improper to combine references where the references teach away from their combination. In re Grasselli, 713 F.2d 731, 743, 218 USPQ 769, 779 (Fed. Cir. 1983).

As explained above, the elements of independent claim 14 are neither disclosed nor suggested in the scope and content of the cited references. Nor are the elements of independent claim 14 obvious in view of the cited references. Consequently, the Office Action has neither properly determined the scope and content of the prior art nor properly ascertained the differences between the prior art and the claimed invention. Accordingly, no reason has been clearly articulated as to why the claim would have been obvious to one of ordinary skill in the art in view of the prior art. Therefore, a *prima facie* case of obviousness has not been established for independent claim 14.

Moreover, Appellants further note that “[i]n determining the differences between the prior art and the claims, the question under 35 U.S.C. § 103 is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious. MPEP § 2141.02 (*citing* Stratoflex, Inc. v. Aeroquip Corp., 713 F.2d 1530, 218 USPQ 871 (Fed. Cir. 1983); Schenck v. Nortron Corp., 713 F.2d 782, 218 USPQ 698 (Fed. Cir. 1983)). Here, the Examiner has not shown that independent claim 14 when viewed as a whole, would have been obvious over *Nourshargh* in view of *Liu* and *Bazylenko*. For at least these additional reasons, a *prima facie* obviousness of independent claim 14 has not been established.

Therefore, the improper rejection of claim 14 under § 103(a) should be reversed.

B. The rejection of claims 15-17, and 24-26 under 35 U.S.C. § 103(a) as being unpatentable over *Nourshargh* in view of *Liu*, *Bazylenko* and *Klein* should be reversed

Claims 15-17, and 24-26 depend from claim 14, and thus require all of the elements recited in claim 14. As discussed above, claim 14 is not obvious over *Nourshargh* in view of *Liu* and *Bazylenko*. If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. In re Fine, 837 F.2d 1071, 5 USPQ 2d 1596 (Fed. Cir. 1988). Accordingly, dependent claims 15-17, and 24-26 are also not obvious over these references.

Klein fails to cure the deficiencies of *Nourshargh*, *Liu*, and *Bazylenko*. *Klein* teaches a general method for sputtering a target using, for example, an RF discharge. *Klein*, col. 4, lines 3-15. *Klein*, however, fails to provide any disclosure or suggestion of at least the element, “the core layer completely and continuously covers an entire surface of the top surface, an entire surface of the sidewalls, and an entire surface of horizontal surfaces between each of the plurality of ridge structures,” as recited in claim 14, and required by dependent claims 15-17 and 24-26.

The elements of dependent claims 15-17 and 24-26 are thus neither disclosed nor suggested by the cited references. Nor are the elements of these dependent claims obvious in view of the cited references. Consequently, the Office Action has neither properly determined the scope and content of the prior art nor properly ascertained the differences between the prior art and the claimed invention. Accordingly, no reason has been clearly articulated as to why the claims would have been obvious to one of ordinary skill in the art in view of the prior art. Therefore, a *prima facie* case of obviousness has not been established for claims 15-17 and 24-26. Accordingly, the improper rejection of claims 15-17 and 24-26 under § 103(a) should be reversed.

C. The rejection of claim 29 under 35 U.S.C. § 103(a) as being unpatentable over *Nourshargh* in view of *Liu*, *Bazylenko* and *Klein* should be reversed

Claim 29 recites elements similar to those recited in claim 14. For example, claim 29 recites a combination including at least “the core layer completely and continuously covers an entire surface of the top surface, an entire surface of the sidewalls, and an entire surface of horizontal surfaces between each of the plurality of ridge structures,” as also recited in claim 14, and required by claims 15-17 and 24-26. As discussed above, a combination including at least this element is not obvious over *Nourshargh*, *Liu*, *Bazylenko*, and *Klein*, nor do these references provide any disclosure or suggestion of at least this element.

Therefore, for at least the reasons presented above with respect to claims 14-17 and 24-26, a *prima facie* case of obviousness is not established with respect to claim 29, nor is claim 29 obvious in view of the applied references. Accordingly, the improper rejection of claim 29 under 35 U.S.C. § 103(a) should be reversed.

D. The rejection of claims 18-20 under 35 U.S.C. § 103(a) as being unpatentable over *Nourshargh* in view of *Liu*, *Bazylenko*, *Klein* and *Kestigian* should be reversed

Claim 18 recites a combination including at least “the core layer completely and continuously covers an entire surface of the top surface, an entire surface of the sidewalls, and an entire surface of horizontal surfaces between each of the plurality of ridge structures.” As discussed above, neither *Nourshargh*, nor *Liu*, nor *Bazylenko*, nor *Klein* provide any disclosure or suggestion of at least this element, nor is a combination including at least this element obvious in view of these references.

Kestigian further fails to cure the deficiencies of *Nourshargh*, *Liu*, *Bazylenko*, and *Klein*. *Kestigian* teaches a method for forming targets for use in ion beam sputtering. *Kestigian*, abstract. *Kestigian*’s method involves the formation of targets wherein plugs with different compositions can be inserted into a plurality of holes formed in the target. *Id.* at col. 3, lines 12-25. *Kestigian*, however, does not teach or suggest the formation of waveguides or core layers. Thus, *Kestigian* fails to provide any disclosure or suggestion of at least a combination including, “the core layer completely and continuously covers an entire surface of the top surface, an entire surface of the sidewalls, and an entire surface of horizontal surfaces between each of the plurality of ridge structures,” as recited in claim 18.

The elements of independent claim 18 are thus neither disclosed nor suggested by the cited references. Nor are the elements of independent claim 18 obvious in view of the cited references. Consequently, the Office Action has neither properly determined the scope and content of the prior art nor properly ascertained the differences between the prior art and the claimed invention. Accordingly, no reason has been clearly articulated as to why the claim would have been obvious to one of ordinary skill in the art in view of the prior art. Therefore, a

prima facie case of obviousness has not been established for independent claim 18. Accordingly, the improper rejection of claim 18 under 35 U.S.C. § 103(a) should be reversed.

Claims 19 and 20 depend from claim 18. If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. In re Fine, 837 F.2d at 1071, 5 USPQ 2d at 1596. Accordingly, the improper rejection of claims 19 and 20 under 35 U.S.C. § 103(a) should be reversed.

E. The rejection of claim 27 under 35 U.S.C. § 103(a) as being unpatentable over *Nourshargh* in view of *Liu*, *Bazylenko*, *Klein* and *Makikawa* should be reversed

Claim 27 depends from claim 14, and thus requires all of the elements of claim 14. As discussed above, neither *Nourshargh*, nor *Liu*, nor *Bazylenko*, nor *Klein* provide any disclosure or suggestion of at least a combination including “the core layer completely and continuously covers an entire surface of the top surface, an entire surface of the sidewalls, and an entire surface of horizontal surfaces between each of the plurality of ridge structures,” as recited in claim 14 and required by claim 27, nor is a combination including at least this feature obvious in view of the cited references. *Makikawa* fails to cure the above-noted deficiencies of these references.

Makikawa generally discloses a method for preparing an optical waveguide substrate. As shown in FIG 1 (c)-(d), *Makikawa* discloses depositing a core layer 14 in grooves 12, and over oxidized substrate 13. *Makikawa* further discloses, however, that:

the surface of the resulting structure is abraded off until the substrate is exposed and a flat surface is defined ... [a]brasion is preferably continued until the buried portions of the core film are abrade several microns. This results in the substrate in which the core film segments 14 and the under clad film 13 are present on the same substrate surface. *Makikawa*, col. 3, lines 34-46.

This cannot constitute a teaching of “the core layer completely and continuously covers an entire surface of the top surface, an entire surface of the sidewalls, and an entire surface of horizontal surfaces between each of the plurality of ridge structures,” as recited in claim 14 and required by claim 27.

The elements of dependent claim 27 are thus neither disclosed nor suggested by the cited references. Nor are the elements of this dependent claims obvious in view of the cited references. Consequently, the Office Action has neither properly determined the scope and content of the prior art nor properly ascertained the differences between the prior art and the claimed invention. Accordingly, no reason has been clearly articulated as to why the claim would have been obvious to one of ordinary skill in the art in view of the prior art. Therefore, a *prima facie* case of obviousness has not been established for claim 27. Accordingly, the improper rejection of claim 27 under 35 U.S.C. § 103(a) should be withdrawn.

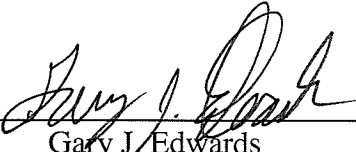
For the reasons given above, pending claims 14-20, 24-27, and 29 are allowable. Appellants respectfully request that the Board reverse the Examiner’s rejections.

To the extent any extension of time under 37 C.F.R. § 1.136 is required to obtain entry of this Appeal Brief, such extension is hereby respectfully requested. If there are any fees due under 37 C.F.R. §§ 1.16 or 1.17 that are not enclosed herewith, including any fees required for an extension of time under 37 C.F.R. § 1.136, please charge such fees to our Deposit Account No. 06-0916.

Respectfully submitted,

FINNEGAN, HENDERSON, FARABOW,
GARRETT & DUNNER, L.L.P.

Dated: June 30, 2008

By: 

Gary J. Edwards
Reg. No. 41,008

VIII. CLAIMS APPENDIX

Claims Appendix to Appeal Brief Under Rule 41.37(c)(1)(viii)

14. A process of fabricating a planar optical device, the process comprising:
- forming a plurality of ridge structures in a lower cladding layer of a first material,
- wherein:
- the lower cladding layer has a first refractive index; and
- each of the plurality of ridge structures has a top surface and sidewalls;
- simultaneously depositing and etching a core layer over the plurality of ridge structures to
- form an intermediate structure, the core layer comprising a core material having a
- second refractive index greater than the first refractive index,
- wherein the core layer completely and continuously covers an entire surface of the top
- surface, an entire surface of the sidewalls, and an entire surface of horizontal
- surfaces between each of the plurality of ridge structures; and
- depositing an upper cladding layer over the intermediate structure, the upper cladding
- layer comprising an upper cladding material having a third refractive index less
- than the second refractive index.

15. The process of Claim 14 wherein depositing the core layer comprises:
depositing the core layer by a physical vapor deposition process wherein at least one of
the plurality of ridge structures is positioned opposite a target comprising the core
material and a first radio frequency power is applied to the target at a first
frequency in the presence of a gas such that a uniform plasma condition is created
in the vicinity of the target; and
sputtering material from the target onto at least one of the plurality of ridge structures.
16. The process of Claim 15 wherein depositing the core layer further comprises
applying a second radio frequency power to at least one of the plurality of ridge
structures.
17. The process of Claim 15 wherein depositing the core layer further comprises
applying a third radio frequency power to the target, wherein the third radio frequency
power is applied at second frequency which is smaller than the first frequency.
18. A process of fabricating a planar optical device, the process comprising:
forming a plurality of ridge structures in a lower cladding layer of a first material,
wherein:
the lower cladding layer has a first refractive index; and
each of the plurality of ridge structures has a top surface and sidewalls;
simultaneously depositing and etching a core layer over the plurality of ridge structures to
form an intermediate structure, the core layer comprising a core material having a
second refractive index greater than the first refractive index,

wherein the core layer completely and continuously covers an entire surface of the top surface, an entire surface of the sidewalls, and an entire surface of horizontal surfaces between each of the plurality of ridge structures;

depositing an upper cladding layer over the intermediate structure, the upper cladding layer comprising an upper cladding material having a third refractive index less than the second refractive index;

wherein depositing the core layer comprises depositing the core layer by a physical vapor deposition process, wherein at least one of the plurality of ridge structures is positioned opposite a central region of a target, wherein the target comprises the central region and outer regions, the central region comprising the core material and the outer regions comprising material of lower refractive index than the core material, and wherein a first radio frequency power is applied to the target in the presence of a gas such that a uniform plasma condition is created in the vicinity of the target and sputtering material from the target onto at least one of the plurality of ridge structures.

19. The process of Claim 18 wherein depositing the core layer further comprises applying a second radio frequency power to at least one of the plurality of ridge structures.
20. The process of Claim 18 wherein the core layer comprises a core portion disposed overlying the top surface, a slab portion overlying horizontal surface, and a sidewall portion disposed on the sidewalls, and wherein the sidewall portion comprises material of the outer regions of the target.

24. The process of Claim 14 wherein depositing the upper cladding layer comprises depositing the upper cladding layer by a physical vapor deposition process wherein the intermediate structure is positioned opposite a cladding target composed of the upper cladding material and a second radio frequency power is applied to the cladding target in the presence of a gas such that a uniform plasma condition is created in the vicinity of the target, sputtering material from the cladding target onto the intermediate structure.
25. The process of Claim 24 wherein depositing the upper cladding layer further comprises applying a third radio frequency power to the intermediate structure.
26. The process of Claim 14 wherein the layer of core material has an average surface roughness of less than about 3 nanometers.
27. The process of Claim 14 wherein forming the ridge structure in the layer of the first material comprises:
- etching at least one of the plurality of ridge structures in a silicon wafer; and exposing the etched silicon wafer to an oxidizing atmosphere under conditions wherein a portion of silicon of the silicon wafer undergoes a reaction to convert at least the ridge structure to a silica ridge structure, thereby forming the layer of a first material on the silicon wafer.
29. A method of fabricating a planar optical device, the method comprising:
- forming a plurality of ridge structures in a layer of cladding material, wherein:
- each of the plurality of ridge structures has a top surface and sidewalls;

forming an intermediate structure by simultaneously depositing and etching core material overlying the plurality of ridge structures by a physical vapor deposition process in which, in the presence of a background gas, a first radio frequency power is applied to a sputtering target comprising the core material and a second radio frequency power is applied to at least one of the plurality of ridge structures wherein the core layer completely and continuously covers an entire surface of the top surface, an entire surface of the sidewalls, and an entire surface of horizontal surfaces formed between each ridge structure of the plurality of ridge structures; and

depositing an upper cladding layer over the intermediate structure, the upper cladding layer comprising a second cladding material, wherein

the refractive index of the core material is greater than the refractive index of the first cladding material and of the second cladding material.

IX. EVIDENCE APPENDIX

NONE

X. RELATED PROCEEDINGS APPENDIX

NONE